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Integrated Asset Integrity Management for HSSE, Sustainability, and Operational Excellence

28–29 APRIL 2026 | BANGKOK, THAILAND

Internal Corrosion Monitoring - Enhanced Safety Through Innovation

KHAIRI KADIR

AXESS-CORROSION

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About Us

Purpose

- To innovate safety and develop end user confidence and trust

Value

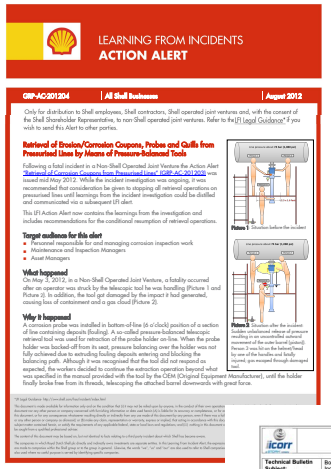
- Uniquely positioned to supply products and services that can complement, integrate and support projects from the design stage, through to maintenance and data retrieval services and analysis

Experience

- A team comprised of experts in monitoring hardware and systems

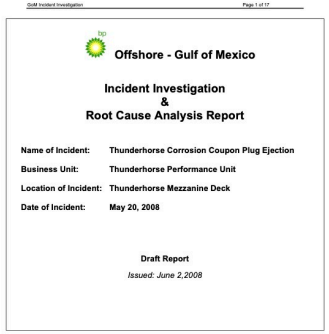
Global Incidents

- High pressure retrieval tools and portable isolations are required for device changeouts under pressure
- Incidents reported globally range from loss of containment, severe injury and fatalities
- Life extension of assets, diluting field experience, and growing concerns around intrusive monitoring techniques called for innovation to solve several problems
- We release the Guard having consulted with a major operator on the design and piloting it successfully


LEARNING FROM INCIDENTS
ACTION ALERT

GIR-AC-2012-04 | All Shell Businesses | August 2012

Retrieval of Erosion/Corrosion Coupons, Probes and Cuffs from Pressurised Lines by Means of Pressure-Balanced Tools


Offshore - Gulf of Mexico

Incident Investigation
&
Root Cause Analysis Report

Name of Incident: Thunderhorse Corrosion Coupon Plug Ejection
Business Unit: Thunderhorse Performance Unit
Location of Incident: Thunderhorse Mezzanine Deck
Date of Incident: May 20, 2008

Draft Report
Issued: June 2,2008


TECHNICAL BULLETIN

Ref: 2-03-004
Rev.0
Issued: 2/2009

Technical Bulletin Subject:	Bottom of Line Mechanical Retrievals Incident	Prepared by:	Mark Wilson
Discipline Area:	Monitoring Services	Date:	17/5/10
Of interest to:	Field Engineers - Retrievals	Approved by (Technical Authority):	Jamie Wilson
Region:	Global	Date:	21/5/10

Introduction
This technical bulletin has been prepared following a request from icorr client Shell regarding an incident which took place on 14th April 2010 at the ONEgas Den Helder GZI site in the Netherlands. The incident involved the on-line replacement of corrosion probes by a third party contractor with no association with icorr. icorr was provided with the official incident investigation report by Shell and was asked to comment on the incident and the potential for similar incidents in icorr retrievals operations for Shell/ONEgas in the UK.

Excerpts from the incident report provided to icorr have been included and discussed within this technical bulletin, however certain details have been left out to preserve anonymity of the third party contractor involved. Where relevant, comments have been made on the content of the incident report by experienced icorr retrievals engineers and by the icorr Monitoring Services lead Technical Authority.

A further discussion is included on the impact on icorr retrievals operations in general and in particular for Shell/ONEgas in the UK. Conclusions and recommendation as they relate to icorr retrievals operations are also included.

This Technical Bulletin has also been subject to input and review by the icorr QHSE Manager due to the safety impact of both the incident and retrievals operations in general.

Discussion of Den Helder Incident
The following sections contain **edited** excerpts from the incident investigation report provided by Shell. Comments by icorr retrievals engineers are shown in Blue and are made on the basis of the report provided only, ie there has been no other investigation into the incident by icorr personnel.

Description of corrosion probe retrieval equipment and process

Figure 1 - LoCal gas flowline and location of corrosion probe fitting

Impact of Incidents Across our Industry

- Fatality in May 2012 lead to many operators suspending online retrieval of intrusive devices
- The fatality occurred during the retrieval of an ER probe installed at the 6 o'clock position on a slug catcher line
- The access fitting had not been serviced in over four years
- Scaffolding was built to accommodate a technician, located directly below the retriever to help support the weight

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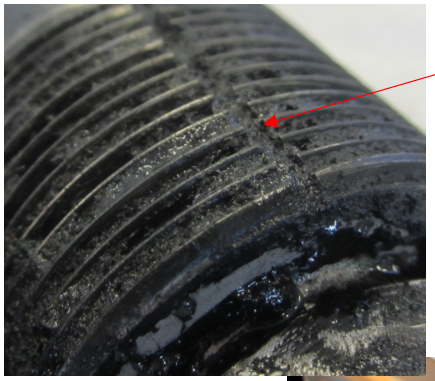
The Challenge

- High pressure mechanical access systems
- Technique requires pressure balance for safe operation
- Equalization channels on carrier plugs can become blocked
- Back pressure pumps can be used to ensure balance but are not always available or practical



Blocked equalization channel on a hollow carrier plug

Blocked equalization ports on a solid carrier plug

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How The Guard Works

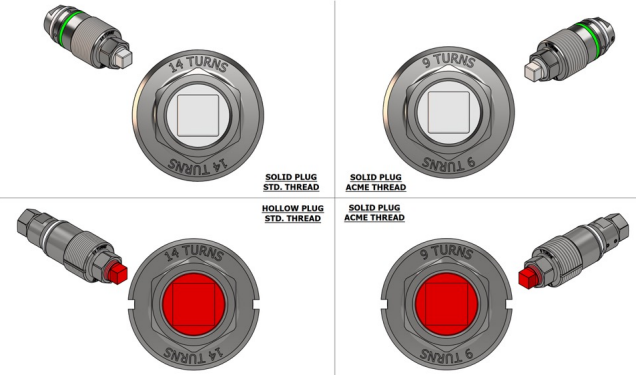
- Remove the line of fire
- **Retrofittable**, auto deploying and built into the retrievers, replacing original components
- Our retrievers with the guard are lighter than other brands without the guard
- Low cost, low maintenance and do not require re-certification of technicians

AXESS CORROSION

JANUSGUARD

Success History – Incident Prevention

- At the end of 2024, two separate incidents were reported where the guard had undoubtedly protected the lives of two technicians.
- The first incident occurred when the technicians were changing out corrosion coupons at the 6 o'clock position. It was assumed that the access fitting contained a 'standard' mechanical 1-3/4 UN thread carrier plug which would require 14 turns to disengage from the access fitting, but it was in fact an ACME thread
- This type requires only 9 turns to disengage, so when the technicians had not achieved pressure equalization in the retrieval tool at the 7th turn, they decided to continue to 10 turns and make an assessment to back pressure, or not. At the ninth turn, the carrier plug disengaged and the retriever suddenly pressurized and stroked at 2200psi. The guard stopped the movement of the outer barrel, and the job site was made safe with a near miss recorded.



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Success History - Client Projects & Received Benefit

- Use on 100% of all flowline locations enabling online monitoring
- Previously unable to utilize telescoping tools due to debris blocking equalization ports
- Recognized internally as embracing innovation and reducing risk
- Guard engaged at 2200psi in November 2024 recorded near miss
- Client feedback was exceptional, and the guard is now a new standard

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SoL Fittings for BoL Monitoring

- Access Fittings for intrusive monitoring systems remain unchanged in over 70 Years.
- The preferred monitoring location in most installations is the 6 o'clock position and this poses multiple technical challenges that can also introduce risk.

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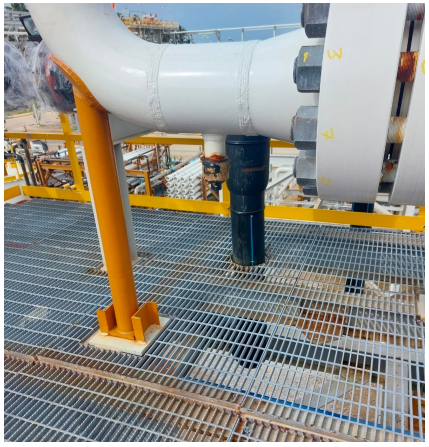
Clearance for retrieval

- The required clearance is often not identified prior to design and fabrication
- This can lead to fittings welded to the pipe that may never be serviced
- In onshore applications access pits may need to be designed and they can accumulate toxic gases and are not always practical or possible



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Performance of 6 o'clock Access Fittings

- Accumulation of debris in the 6 o'clock access fitting "trap"
- Risk of retrieval tools not equalizing as per their design due to blockages
- Majority of reported incidents ranging in severity from loss of containment to fatality, occur at 6 o'clock

Alternative monitoring points

- 3/9 o'clock positioning often leads to monitoring the oil wetted surface and not the water wetted surface
- 12 o'clock positioning leads to longer devices reaching to the bottom of the pipe
- This creates wake frequency concerns and requires longer and heavier retrieval equipment and often the need for scaffolding

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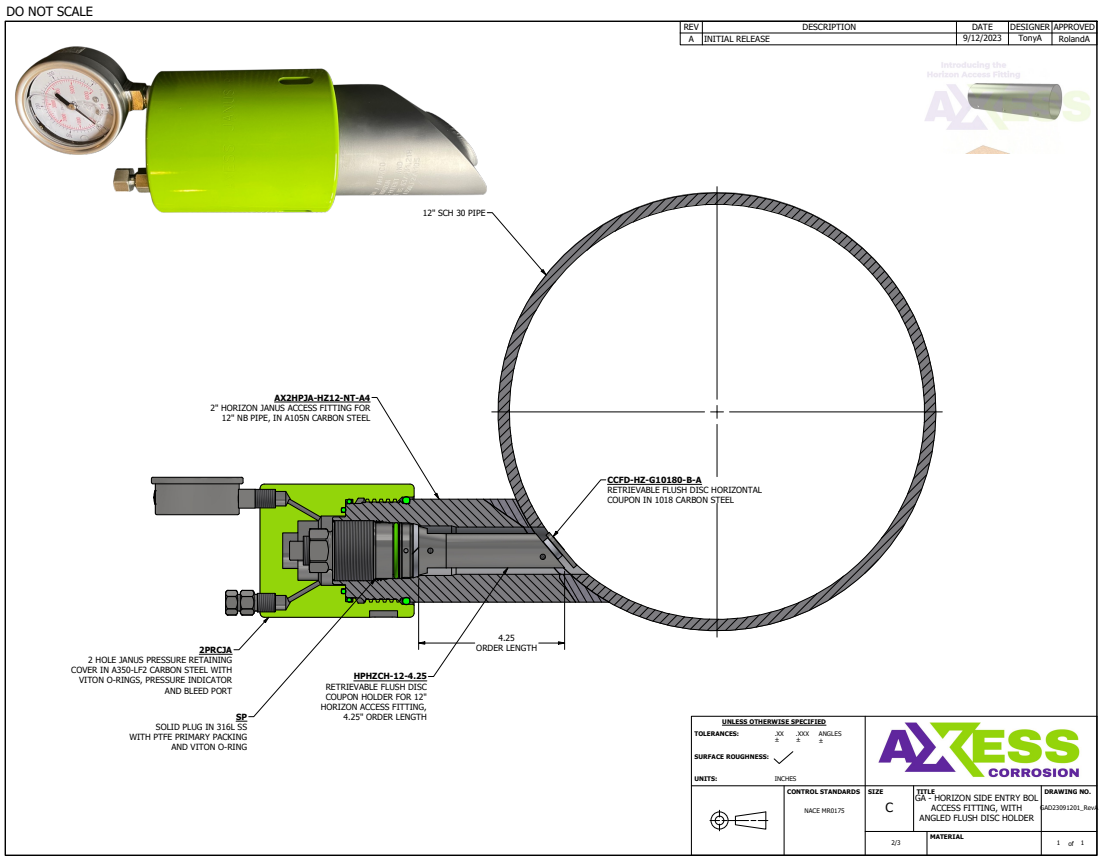
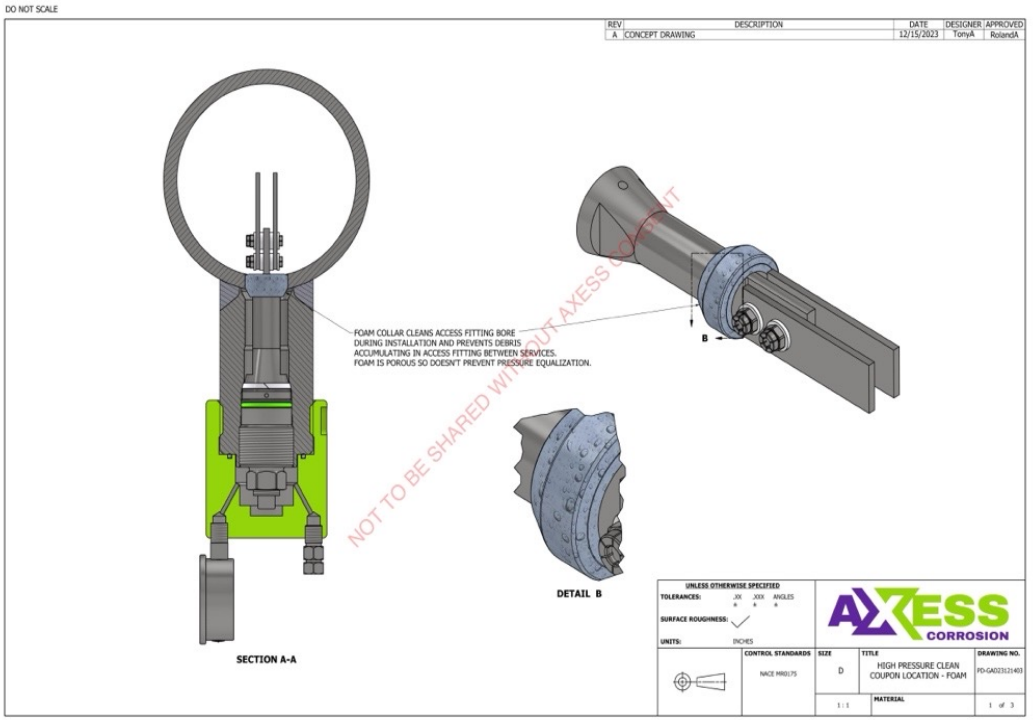
Technology Overview

- A fitting designed for bottom of the line (BoL), monitoring from a side of the line (SoL) entry point
- Does not have limitations with ground clearance
- Less likely to accumulate debris and choke up the equalization ports
- Can be welded using SMAW, hot-tapped and the ”cookie” retained



Debris Sweep and Protect

- Applies to all welded coupon locations
- Non-pressure sealing design allows for sweeping clean the internal access fitting bore during installation
- Once installed, the sweep ring prevents debris from accumulating



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What Sets Us Apart?

- Designed and patented guards designed for all online retrieval tools, including legacy tools, to make them safer
- Designed an improved access system to reduce the risk of exposure to people and environment of toxic gases
- Minimal changes to existing procedures a dramatic impact on risk reduction HAZID/JSA/RA/ change dramatically
- By removing risks, we can train operators to carry out the task safely and within time frames previously impossible to achieve
- Winners of the AMPP Innovation Awards 2023
- Winners of the MECOC Award 2025
- Finalists of the AMPP Innovation Awards 2025

MP MATERIALS PERFORMANCE
CORROSION INNOVATION OF THE YEAR AWARDS 2023

MECOC EXPO 2025